

Patent Claims

1. A method for sending data in the form of Ethernet
5 messages on an Ethernet transmission link, having the
following method steps:
the data to be sent are converted in line with a
transmission standard of the Ethernet protocol, in
order to provide Ethernet messages, and
10 the provided Ethernet messages are cyclically sent
using a prescribed Ethernet transmission standard,
wherein
the transmission operation for the provided Ethernet
messages is controlled such that following an Ethernet
15 message which has been sent the next Ethernet message
is sent directly, while observing the break time
defined in the Ethernet transmission standard, so as to
output Ethernet messages onto the Ethernet transmission
link continuously during the entire cycle time.
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2. The method as claimed in claim 1, wherein for
ongoing transmission of the provided Ethernet messages
the length of the cycle time is adapted, for a
prescribed length of the Ethernet messages, within the
25 framework of the maximum permissible duration of the
cycle in order to output Ethernet messages onto the
Ethernet transmission link continuously during the
entire cycle time.
- 30 3. The method as claimed in claim 1, wherein for
ongoing transmission of the provided Ethernet messages
the number and/or the length of the Ethernet messages
which are to be sent in a cycle is adapted, for a
prescribed cycle time, in order to output Ethernet
35 messages onto the Ethernet transmission link
continuously during the entire prescribed cycle time.

4. The method as claimed in claim 3, wherein for calculating the number and/or the length of the Ethernet messages which are to be sent in a cycle the baud rate used on the Ethernet transmission link, the
5 length of the start identifier, preamble and checksum inserted into the respective Ethernet message when the data are converted in line with the transmission standard of the Ethernet protocol, and the length of the break time to be observed between the Ethernet
10 messages which are to be sent are taken into account.

5. The method as claimed in claim 4, wherein the maximum bit length L of the Ethernet message which is to be sent in a cycle is calculated as follows:
15
$$L = (ba * zy) - (st + pr + ch + pa),$$
where the baud rate used on the Ethernet transmission link is ba Mbaud, the cycle time is zy μ s, the length of the start identifier is st bits, the length of the preamble is pr bits, the length of the checksum is
20 ch bits and the break time is pa bits.

6. The method as claimed in claim 5, wherein when the maximum bit length L is greater than the maximum possible bit length of the Ethernet messages the number
25 and length of the Ethernet messages to be sent are chosen such that in one cycle a plurality of Ethernet messages are sent whose total bit length corresponds to the cycle time.

30 7. The method as claimed in one of claims 1 to 6, wherein for ongoing transmission of the provided Ethernet messages the provided messages are buffer-stored in a buffer store and the transmission operation is started as soon as a prescribed filling
35 level has been achieved in the buffer store.

8. The method as claimed in one of claims 1 to 7, wherein the data to be sent are real-time data and a

real-time application generating the real-time data which are to be sent is synchronized to the transmission operation for the Ethernet messages.

- 5 9. A node for an Ethernet network, having
a control unit (1; 11, 12) for converting data which
are to be sent in line with a transmission standard
from the Ethernet protocol in order to provide Ethernet
messages, and
10 a transmission unit (3; 31, 33) for cyclically sending
the provided Ethernet messages using a prescribed
Ethernet transmission standard on an Ethernet
transmission link (2),
wherein
15 the control unit (1; 11, 12) controls the transmission
operation for the provided Ethernet messages by the
transmission unit (3; 31, 33) such that following a
transmitted Ethernet message the next Ethernet message
is sent directly, while observing the break time
20 defined in the Ethernet transmission standard, so as to
output Ethernet messages onto the Ethernet transmission
link (2) continuously during the entire cycle time.

10. The node as claimed in claim 9, wherein the
25 control unit (1; 11, 12) is designed to adapt the
length of the cycle time, for a prescribed length of
the Ethernet messages which are to be sent, within the
framework of the maximum permissible duration of the
cycle in order to output Ethernet messages onto the
30 Ethernet transmission link (2) continuously during the
entire cycle time.

11. The node as claimed in claim 9, wherein the
control unit (1; 11, 12) is designed to adapt the
35 number and/or length of the Ethernet messages which are
to be sent in a cycle to a prescribed cycle time in
order to output Ethernet messages onto the Ethernet

transmission link (2) continuously during the entire prescribed cycle time.

12. The node as claimed in one of claims 9 to 11,
5 wherein the transmission unit (3; 31, 33) has a buffer store (33) for buffer-storing the provided Ethernet messages, the control unit (1; 11, 12) being designed to start the transmission operation on the basis of a prescribed filling level in the buffer store (33).

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13. The node as claimed in one of claims 9 to 12, wherein the control unit (1; 11, 12) is designed to synchronize a real-time application generating the real-time data which are to be sent to the transmission
15 operation for the Ethernet messages.

14. An Ethernet network having an Ethernet transmission link (2) and a plurality of nodes (1) connected to the Ethernet transmission link as claimed
20 in one of claims 9 to 13, wherein the transmission channel for the Ethernet transmission link (2) is designed to transmit the Ethernet messages without collision.

25 15. The Ethernet network as claimed in claim 14, wherein the Ethernet transmission link (2) has a ring-shaped topological arrangement and the Ethernet messages sent by the transmission node (1) are forwarded from one node to the next node.